

Towards management scales internalising conflicts : case studies in South of France

O. BARRETEAU¹, F. CERNESSON², P. GARIN¹, G. BELAUD³

ABSTRACT

The implementation of new regulations concerning water use all over the world, as Water Framework Directive in Europe, are pushing ahead the river basin as the relevant space scale for management. This choice aims notably at internalising conflicts. However it is difficult to implement since connections exist between many neighbouring basins or between surface basin and groundwater, and as soon as stakeholders are involved they extend the scale concerned by their water related interactions due to intertwined stakes and virtual exchange of water through agricultural goods. A unique relation between any point of space and a water management territory is thus difficult to reach. This paper deals with this issue of finding suitable scales to manage water. It is based on four examples within the same river basin where a basin institution is existing. These examples describe various cases of interactions, direct or indirect, involving various kinds of organisational levels. For all of them the level of conflictuality is rather low. All of them are missing debates about future of the territory which could however provide the basis for institutionalisation of water management.

These case studies are leading to propose to leave away the idea of a unique relation defining the suitable scale for water management. However we propose as a new role for basin institution to check the coherence of water related activities, facilitate the setting up of institution at an ad hoc scale for each specific stake.

Key Words : River basin management, concerted action, organizational level, management scale

RESUME

La mise en œuvre de nouvelles réglementations concernant l'usage de l'eau un peu partout dans le monde, tel que la Directive Cadre sur l'Eau, mettent en avant le bassin versant comme l'échelle de gestion adaptée. Ce choix a notamment pour but d'internaliser les conflits à l'échelle de gestion. Il est cependant difficile de le mettre en œuvre puisqu'il existe des transferts inter-bassins ainsi que des connections entre nappe et eau de surface, et dès que les acteurs sont impliqués, ils étendent leur échelle de référence relative à la ressource en eau, du fait par exemple d'enjeux croisés et d'échanges d'eau virtuels au travers de produits agricoles. Une relation unique entre chaque point de l'espace et un territoire de gestion de l'eau est de ce fait difficile à définir. Le propos de cette communication est de travailler la question des échelles pertinentes pour la gestion de l'eau. Nous nous basons sur quatre exemples au sein d'un même bassin versant où il existe une institution de bassin. Ces exemples décrivent une variété de types d'interactions, directes ou indirectes, impliquant différents types de niveaux d'organisation. Pour chacun d'entre eux, le niveau de conflictualité est faible. Dans chacun un débat sur le futur souhaité du territoire est absent et manque pour fournir une base à une institutionnalisation locale de la gestion de l'eau.

Ces études de cas amènent à abandonner l'idée d'une relation unique définissant l'échelle adaptée pour la gestion de l'eau. Cependant nous proposons comme nouveau rôle pour les institutions de bassin la mise en cohérence des actions locales concernant l'eau et l'appui à l'émergence d'institutions à l'échelle ad hoc pour chaque enjeu spécifique.

¹ Cemagref IRMO, 361 rue J.-F. Breton, BP 5095, 34033 Montpellier Cedex, France

² UMR 3S Cemagref/ENGREF, 500 rue J.-F. Breton, BP5095, 34033 Montpellier Cedex, France

³ ENSAM, 2 place Viala, 34070 Montpellier, France

Mots-clés : Gestion de bassin versant, action concertée, niveau d'organisation, échelle de gestion

“Too large water bodies should not thwart local dynamics of territories, sub-basins which are doing well by themselves”⁴. While acting as the president of a local water commission, at the basin scale, the mayor who says that stresses on the fact that river basin management has to be coherent with dynamics of other local territories. Conflicts, and more generally interactions among actors exist and are mediated through all these dynamics. Thus river basin can not be considered as the only scale to manage conflicts dealing with water issues. The definition of a relevant scale for water conflict management is a tricky question, at stake within the implementation of the European Water Framework Directive.

After explaining all the territories which might suit water conflicts management, this paper describes four case studies in a given basin in South of France. It leads to recommend to abandon the idea of a perfect paving of space, but to choose ad hoc territories, profiting by the induced complexity to go to positive sum games.

WATER POLICY AT THE BASIN SCALE

Assumptions leading to RBM

One of the major assumptions to be found when dealing with water management issues is that the river basin, or in some cases the groundwater system, is the suitable scale for thinking as well as decision making. European new Water Framework Directive is an example of that trend: after extending the concept to any kind of “water body or group of water bodies” it aims at bringing all member states to adapt their water policy to that decision scale, which a few of them was already using, such as Spain or France. South Africa, Brazil, Australia are all adapting their water law in that direction as well.

This assumption is coming from the acknowledgement of failure of water policies based on more classical administrative territories to manage environmental stakes such as water quality or sharing a limited amount of water (Bouwer, 2000). Such integrated management has begun partially some 30 years ago with experiments of multi-objective management, however a full integration has not been reached even though the many advocates (Duda and Ashry, 2000) and WFD for example is a new step in that direction. This path towards river basin based management, or water bodies based, holds on several rationales:

- It should allow to manage the whole water basin within the same institution,
- It should be able to tackle impacts of management choices,
- It internalises all interactions through water which may take place so that a discussion place exists to manage in good understanding actual conflicts among stakeholders to reach a concerted management,
- It should constitute a common shared entity to be taken more in consideration.

This paper is aiming at discussing the third rationale.

Consistency of this rationale

River basin is a physical scale while conflict or dialogue have at least a strong social component. In the broader field of environment management, there is a great divide between physical and social

⁴ Extract of the intervention of a mayor and president of the Local Water Commission of a southern French basin, during a meeting of “water actors” of the area.

scales: the first is based on processes while the second one is based on view points on and feed backs, possibly indirect from the resource. (Meadowcroft, 2002).

The third rationale above is not coherent with several observations, be them concerning physic, social or stake issues.

Physically first, it is very hard to take into account all the interactions about water in a single system different than the Earth as a whole. By physical interactions, we mean those who are depending by an exchange of goods, direct or indirect. Hydrosystems are open first through inter basin transfer. If connected by a channel from the Rhone River across French Languedoc, would Barcelona belong to the Rhone water district? But Barcelona is also crossed by the Llobregat River and have connections with the Ebro basin. To implement the first rationale mentioned above, any water based territory to which Barcelona would belong to should include at least Barcelona, Rhone river and Ebro basin

Then another kind of physical interactions is due to overlapping of surface and ground water. In the coastal area of Roussillon, most irrigated lands could be irrigated either from a coastal ground water, or from surface water. Then the water withdrawn from a river is remaining in the ground water. This constitutes a kind of indirect physical interaction. Thus a farm of this area should be in both water bodies whatever hydrological connections among them are.

Second kind of indirect physical interactions is taking place through the exchange of goods in which water is production factor. This is known as virtual water since that instead of transporting water, goods produced thanks to irrigation water are travelling. Exportations of tomatoes from Morocco to Europe for example is said to be equivalent to transferring the amount of water needed to grow these tomatoes in Europe. To internalise all the interactions related to water, Morocco and Europe should be in the same entity!

From a social point of view, stakeholders are hold in social networks. These are not dealing specifically with water issues but may have large overlapping of their composition. For example temples in Bali constitute such social networks which facilitate co-ordination among farmers to limit peaks of water demand, even though it is not consciously done (Lansing, 1999). These social networks are places where innovations are conceived and individual behavioural patterns evolve (Axtell, 2000): farmers' unions have thus mediated in South of France changes of practices of vine growers for weed management (which is influencing water quality) (Maton, 2001). The quality of interactions in these networks is thus influencing the interactions about water issues.

When they have a territorial basis, these social networks are not necessarily linked to any water body or group of water bodies: farmers' unions have an organization in unions, federations and confederation following the same hierarchy as administrative levels. However any definition of a territory dealing with water issues have to be able to take them in account.

Last limit to internalisation of all interactions through water bodies based management is due to interdependency of stakes. All the stakeholders involved in a dialogue process are dealing with several stakes at the same time, local representative of French Agriculture Department in a SAGE process is fluctuating with several "hats" interfering with four stakes: cultural issues of the territory, economic development, communal policies and employment (Lascoumes and Le Bourhis, 1998). During any dialog process, participants are playing roles according notably to whom they are representing during that process. They can play also personal roles and also switch of roles along the discussion. They can even play several roles at the same time, with no necessary coherence among them but possibility of interactions (Innes and Booher, 1999).

Which suitable scale ?

The three limits above underline the difficulties to define any unique partition in suitable territories for water policy making due to the multiplicity of possible criteria to define such partition. However

this is due for the implementation of Water Framework Directive. It is actually delegating the effective definition of water bodies to member states themselves, as well as their gathering for management and planning purposes. The only constraint provided by the Directive is that all these territories have to be designed strictly within the borders of already defined water district, corresponding basically to great river basins.

The definition of these territories is currently under way. In France Water Agencies are in charge of this. They are facing this difficulty of physical ambiguity which is not strictly compatible with a real partition of the districts, i.e. an association between any locale of the district with one and only one water body, as well as the association between any water body with one and only one group for management and planning. If the interactions dealing with water are only taken in account, it leads to look for territories whose borders are characterized by the absence of any flow of water across, in any form (Mermet and Treyer, 2001). The issue is then whether it might lead to a significant number of different territories or not, depending on the nature of flows considered and on the thresholds associated to them.

If all kinds of interactions are to be considered, and especially those linked to social networks, the problem of defining those territories is still more difficult. The issue is then whether such a unique association, even at various depth with surface and underground water, is feasible or not.

However, the original idea of finding a relevant scale to internalise conflicts is still interesting and totally fitting current issues raised by the WFD implementation. Our paper is thus addressing the issue of finding characteristics of such a scale through the cross-analysis of four cases studies in Orb Valley in South of France. This is not only a question of spatial basis for water management processes but also of sets of actors to be involved in these processes.

FIELD STUDY

The four case studies which have been analysed are all situated in Orb basin in South of France and are dealing with stakes identified as conflicts. Maps in figure 1 and 2 are localizing and summarizing them. These case studies were conducted through interviews of key informants and bibliography checking by students of an Agronomy Engineering School in Montpellier during a one month exercise whose objective was for them to understand the multiplicity and equal legitimacy of viewpoints existing on the river.

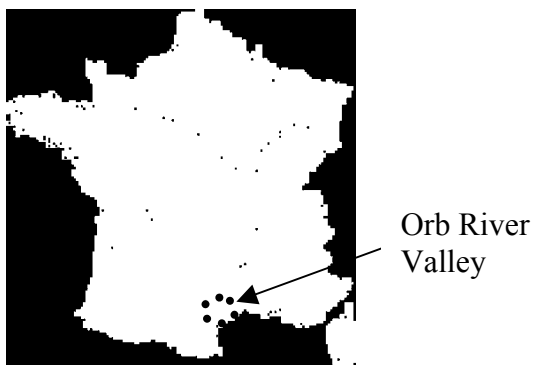


Figure 1 : Orb river valley within Rhône Méditerranée Corse Water Agency

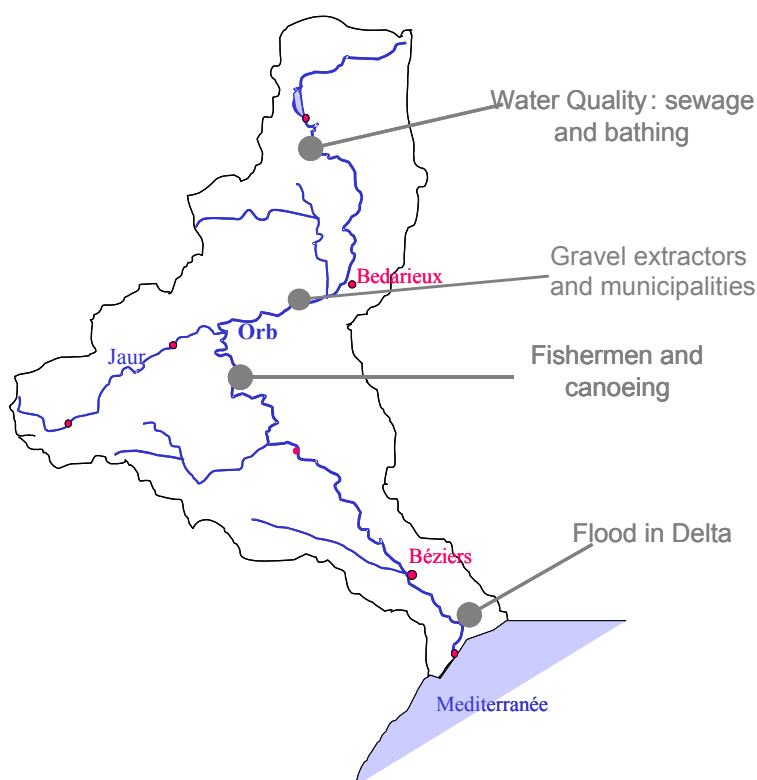


Figure 2 : situation of case studies within the Orb basin

All these case studies take place within the same common frame of the Orb valley's "Contrat de Rivière", which is an institution locally signed up in 1996 and sticking to the frame established by the 1964 and 1992 French water acts: these "river contracts" are agreements between local bodies aiming at developing a water policy at the scale of the river basin, they are part of the French institutional organization for water management (Nagaraj, 1999). It appears as being an explicit place for negotiation (Salles and Zelem, 1998). In the case of Orb valley these local bodies are notably the Hérault county, municipalities and district councils, which are organising through this frame a genuine participatory process taking place within a "Syndicat Mixte de la Vallée de l'Orb (SMVO)", whose members are each village's district councils and the department assembly ("Conseil Général"). It involves also a specific institution, the "Conseil consultatif" (advisory council), which is made of NGOs with a relation with water affairs (ecologists, fishermen, riverside land owners...), professional representatives (tourism, agricultural or industrial corporations...), private companies and other public bodies involved with water management in this basin. The policy aims of the river contract are: flood management, water quality and sewage processing, river banks management and water scarcity at summer time.

Issues linked to the four case studies are: bathing and sewage management, gravel extraction, concurrence in access to the river between fishing and canoeing, flood management in the Delta. They are presented below from upstream to downstream.

Bathing and sewage management⁵

Tourism is a key element of economic development of upper part of the basin, as pointed out by county officials as well as SMVO, which is however not fully seen as very important by mayors and citizens of upstream municipalities. Appeal of the area depends notably on the availability of bathing places along the river or its tributaries. This availability is however depending on the quality of water and thus, for each municipality of the management of sewage and wastes by more

⁵ This part is based on the report "Assainissement et baignade dans la vallée de l'Orb : enjeux, constat et relations entre acteurs", by L. Graveleau, J.-F. Holley, S. Le Quellenec and M.-A. Lodi, ENSAM, UA "Gestion de la ressource en eau", 2001.

upstream actors. Indirect interactions through the impact on river quality are at stake here. Thus one municipality faced in the second half of the 90s several legal bathing interdiction due to too poor water quality. We consider here an area determined by the bathing places of this municipality and the direct relations with actors upstream which could be in relation with its water quality.

This case is characterized by the possible uncertainty in the definition of the source of pollution, the multiplicity of actors involved in the issue without any common local institution and a low concernment of stakeholders. The potential sources of pollution are weaknesses of sewage plants of municipalities upstream, a winegrowing cooperative and a cosmetic plant. Each of them is cited at least once as being potentially partly responsible for the low water quality. Some indicators on the type of pollutants are available and could be used to identify category of use responsible for the pollution, but they are never referred to. Actors prefer keeping citing some useful scapegoats.

Eight municipalities are concerned, including the one at downstream part which is facing bathing interdiction. Even if there is a local district institution aiming at dealing with sewage and water cleaning issues, the most downstream municipality, with the bathing problem is not part of it. Very few references are made to the “Contrat de Rivière” or the SMVO which is not activated here as a common framework to manage interactions.

Low concernment of most stakeholders, including the municipality with bathing interdiction, is due to the low level of local expectations on the potentiality of tourism for local economic development. The problem of water quality is actually not considered as very serious. It is getting along with a strong involvement of state representatives, and notably the health department.

In this case, a top down management through strong involvement of state is getting along with little appropriation of the issue by local actors, in terms of action as well as in terms of willingness to improve the situation. The exclusion of one municipality of the district setting, due to an administrative border (between two “cantons”), may explain some of the encountered difficulties: some remote places of the downstream municipality, close to this border, are not connected to any sewage network, too far from one and out of the territory of the other. The problem perceived here is taking place at the border of the management unit.

However it cannot be the only explanation. The operational entity here is the local representation of state: leading to a poor appropriation of stakes or substituting to local actors because of this low concernment?

Gravel extraction⁶

An area of stocking and treatment of gravels is situated on a former site of gravel exploitation in the major bed of the river. The impacts of this area engendered more or less latent conflicts with some users of the river, as the municipality which is downstream to the career. However, other users do not complain about this exploitation.

This case is first characterized by the variety of impacts which affect not only water : presence of fine dusts in the water and in the sediments of the river (problem of water and ecosystem quality) but also damaging of river banks (problem when flood happened) and noise. Two other impacts are significant : the drop of the alluvial water-table due to the ancient function of the site and the visual pollution of the quarry in a massive cliff.

The second element is the difference of the position of the two municipalities, one is downstream of the area, and supplying the drinking water from the alluvial water-table, and the second one on the other bank, place of the area of stocking and treatment of gravels, but also of the quarry, and supplying the drinking water from a deep water-table upstream the area. An association of these two

⁶ This part is based on the report “Etude sur le bassin versant de l’Orb: relations entre carriers et communes”, by D. Créquer, D. Pagliaccia, X. Pellier and E. Tarbagayre, ENSAM, UA “Gestion de la ressource en eau”, 2001.

municipalities with another one exists in order to maintain the river banks, known as a SIVU⁷. The classification of the impacts is not the same for the two municipalities. The third element is the low level of concern of the independent quarry owner who refused to be interviewed and the high level of concern of the quarry company association about the environmental questions. The interaction with the economical issue, and notably employment is important. The water officer adopts a neutral position in reference with the laws. The only stakeholder who referred explicitly to the river contract is the responsible of the quarry company association, the two municipalities made a reference to the SIVU. The expectation is the reduction of the environmental impacts of the all activities of the production of the gravels.

Even if the classification of the impacts is not the same for the two municipalities, the maintenance of the river banks is a strong issue (to protect against flood) and the presence of a SIVU allows a sharing of the financing and of the team of maintenance.

The downstream municipality took already the quarry owner to court. More recently, the regulation tools seem efficient to obtain some modification of the practices for the stocking and treatment of gravels. The other municipality is more moderate with its critics, stressing on the employment issue. However the current municipalities association pattern makes the taxes of the quarry goes only to the second one, on which territory it is located.

In one hand, there is a “nimby”⁸ situation, notably concerning the visual pollution and the noise, and the responsible of the quarry company association explain the constraints of the production of the gravels to the municipalities. For the ecological aspects, he works with the fishermen association at the regional level. In the other hand, the municipalities wish to associate more efficiently the quarry owner in the maintenance of the river in order to limit the filling up of the river by rocks, gravels.

In conclusion, there should be a reconsideration of intermunicipal pattern, sharing better costs and benefits of the presence of potential nuisances due to some activities. Moreover it might provide a useful place for a higher level of dialogue between these actors, so that a real environmental management might be implemented.

Fishing and canoeing⁹

Fishing is a very old leisure activity on the Orb River and its tributaries. In France, fishing is very regulated. It is necessary to buy a license and to belong to a registered fishing association to have the right to fish. The sale of license for one week or more for the tourists develops. There are 11 registered fishing associations that share the Orb River and its tributaries.

Canoeing is a much more recent activity, which has developed for approximately thirty years. No license is required and it is allowed to practice it almost anywhere. There are associations to develop the competitive practice and also private and independent renters who propose tours starting from water-sport bases. There are two associations and three hirers out canoes on the Orb River.

The first time the canoes sailed on the Orb River there were usual reject reactions from the ancient users (the fishermen) towards the new ones (the canoeing), with stone thrown on the boats and lawsuits to ban this new activity. The fear of the fishermen related to the destruction of the spawning grounds, the noise, and the coming trough the fishing lines.

⁷ SIVU states for “Syndicat Intercommunal Vocation Unique”, which means association of communes with a unique goal (here it is bank management)

⁸ stands for “Not In My Back Yard”, which the common denomination of all environmental conflicts when public benefits are wanted but private costs refused.

⁹ This part is based on the report “Les relations kayakistes/pêcheurs sur la rivière Orb”, by E. Baer, M. Breuil, X. Delpuech and E. Sivade, ENSAM, UA “Gestion de la ressource en eau”, 2001.

There was no mediation at the basin level. The two Departmental Unions of Fishing and of Canoeing intervened only during the lawsuit helping their members to defend their rights. But then, they did not intervene in the search for solutions, when the verdict confirmed that the access to the river is free for canoes.

The conflicts were reduced by local dialogue, between the renters out canoes, the club managers and president of fishing associations. They all live close to each other and they frequent the same places of conviviality and exchanges in the villages (i.e. bars, stadium, town halls...). Making minor concessions and exchanging basic information, they conclude informal agreements. These agreements are based on a share of time and space to prevent that fishermen and canoes are at the same place at the same moment:

The best reaches for fishing are upstream of the Orb river and along its tributaries, where the flow is seldom sufficient for a pleasant canoeing. Clubs and renters promised not to sail on this part. They concentrated on the median zone of Orb, where the width of the river allows the cohabitation of both activities (cf figure 2). Only three fishing associations among the 11 of the basin must still cohabit and share the river with canoes.

The sporting canoeing is mainly practiced during the spring and the autumn, when the flows are high and the river as broad as possible. These sportsmen know the spot where the fishermen concentrate, they are canoeing with skill and they pay attention to avoid coming through the fishing lines.

In summer, when it is necessary to share the river between the fishing tourists (a few tens per day) and with the canoeing tourist who don't control their boats (140 to 150 boats per day), the fishermen come to the river early in the morning and in the evening, the hours most favorable for their leisure activity and the canoes sail during the day.

When disputes still occur, they are sorted out by phone or at bar, between these local representatives.

Moreover, the canoe renters and the sportive associations carry out campaigns for environmental protection among their members or clients (i.e. leaflets recommending waste collection, etc.).

Beyond these informal agreements, canoeing and fishing representatives have been combining to claim a better dialogue for water release from the upstream dam.

However emerging difficulties illustrate the limits of this conflict prevention strategy managed at the local level.

The fishing association managers and the canoe renters are really tempted to develop their offer for summer leisure activities, to answer an increasing demand from the tourism sector. In the south of France, there are already examples of rivers with canoes' traffic jam during summer. The fishermen fear that the canoes extend upstream, towards the best and fragile fishing sites.

The landowners bordering on the rivers have not been involved in these agreements. They are more and more complaining about the damage caused by the boats (rubbish, degradation of the banks and of the roads where the canoes accost). More and more of landowners are closing the access to the river and enclose the banks.

These issues involved much more stakeholders and call for a participatory process on tourism expansion planning, at a larger scale than the actual local arena. But it is not clear that it must be done at the basin level, at the more political and administrative level of the Hérault Department, or at both scales with an appropriate coordination process.

Flood in the Delta¹⁰

The downstream part of the basin consists of a delta with a main channel and former branches flowing only during floods. Serious floods occur regularly on the basin, mainly in spring and

¹⁰ This part is based on the report "Analyse de la gestion des crues dans un ancien Delta", by E. Esteve, O. Lefebvre and L. Owsianka, ENSAM, UA "Gestion de la ressource en eau", 2001.

autumn for violent events but also in winter with slighter but sometimes longer events. The area is weakly inhabited permanently but several activities interfere and are concerned by floods:

- Camping grounds lay on the seaside; tourists are to be protected in season, which is thus limited in time with some potential losses of income for camp owners; moreover mobile-homes are threatened during autumn and winter floods when camps are closed.
- The flood plain is fertile and largely cultivated but there are two threats: salinization by sea water intrusion, against which fresh water is needed; excessive duration of submergence: floods should not be too long nor too frequent.
- The area is also at the interface of marine and continental media, which gives it a high ecological interest. Fishing, hunting and hiking are practiced there by local people and tourists.
- Some fields are also pastured by sheep and bull herds.

The way to manage these floods is thus leading to various propositions depending on the needs for presence of freshwater in the area. It is going from building of dikes (for which position and elevation has then to be discussed) to cleaning-out or resizing of former river channels. However these solutions may be costly, are heavily modifying permanently water flows in the Delta and may induce new land uses in a context of high demand for building new houses in the area. Modifications of water flows in case of floods is of course very sensitive since some actors are perceiving solutions wished by others as degrading their own situation. For them *statu quo* may be a better solution than for example any works protecting other actors and potentially flooding them more.

Thus several stakeholders are strongly involved in the flood management at various scales and according to various rationales (territory but also corporation):

- Locally, on corporative rationale, farmers (cereal and wine growers) are represented by a public water user association; professionals of tourism (mainly camp owners) are organized in an association as well, fishermen are represented by their trade union; hunting is not a professional activity but hunters are well organized in associations. These various corporations, though not in an open conflict, are proposing solutions and futures for the area, which do not seem to be compatible one another.
- Municipalities: among the six municipalities overlapping the basin, mainly two are directly involved, concerned by the protection of their inhabitants as well as their perspectives of economic and population development.
- State agencies: the Public Works Department is responsible for flood warning and civil engineering; the Environment Department is involved in the enforcement of environmental directives and in the promotion of alternative environmentally sounded solutions; Agriculture Department is also involved to a lesser degree. Positions of these administrations need also a dialogue at their level which is not taking place up to now!

Little reference is made to the river contract and to upstream stakeholders. The hydraulic processes are assumed to be understood since hydraulic modelling of the river have been carried out. There is more uncertainty as far as salt is concerned.

In this case a situation of complex interactions not well handled by stakeholders is amplified by a strong intervention of two local representations of state administration, which is not managing the interactions between their actions *ex ante*. The case, which is maybe the most potentially conflicting of all, is thus managed at a larger scale than the delta, with very few relation to the whole basin, with no improvement of the level of agreement between actors, if it is not a reinforcement of conflicts. The low involvement of municipalities make them not appearing as the place for dialogue before the intervention of state representatives. It might be a way to develop since economic development and choice of future for the area are finally at stake.

Cross-analysis

These four case studies are presenting various kinds of interactions:

- Access to space
- Existence of counterpart (through goods or services)
- Impacts of activities needing the river
- Through various organization levels.

They are characterized by a few common points: there is a low level of conflictuality, interactions are rather complex since they are connected to several stakes at the same time and they refer all to a “project of territory”. This “project of territory” should be chosen and legitimated locally, but the choice is sometimes blurred by the absence at the forefront of the territorial actors (i.e. municipalities or association of municipalities), since the debate is mainly at the level either of the corporations of users or of state representatives, which can be used as advocates by some categories of users. Thus the debate which should take place for a genuine choice of future for the territory is not taking place openly, while it is recommended for a legitimisation of the outcome of the process as in patrimonial approach (Babin and Bertrand, 1998).

DISCUSSION

These case studies are featuring various kinds of scales and networks activated to manage interactions among stakeholders in not too much conflicting situations: state agencies, corporative networks, associations of communes... This allows to point out several conditions which should be taken into account when defining suitable territories and actors networks for water management.

Adapted scale

A first need is that the territory chosen to deal with a given issue has to allow the internalisation of interactions dealing with this issue, as well as the actors involved. If the issue is water quality in a given place, the potential producers of pollutants and the actors potentially subjected to pollution should have a common place available for dialogue. This common place is supposed to act as a support to build a shared language and representation of the issue. It is also supposed to give the opportunity to handle the interactions on a regular basis, preventing reaching untractable conflicts.

A common failure to reach an agreement among actors is situation of “zero sum games”, engendering “NIMBY” behavioural patterns. These are the sign of closed negotiations, in which the only gains one party may get is through losses of other parties. These situations need an opening of the debate, which might be reached by the introduction of other kinds of interactions. In the gravel extraction case, this might be reached through the simultaneous management of impacts of the mining activity but also on the benefits it might provide through taxes or employment for example. When given the opportunity to handle the diversity of related stakes, heterogeneity of positions may appear and pave the way for possible alliances (Steinberg and Clark, 1999). The territory chosen should then provide the place for dialogue on both categories of interactions at the same time.

This should not lead however towards a too large territory or set of actors involved, which is the case in the fourth case study: other conflicts among actors introduced in the process through such an enlargement process may then diffuse on the interactions initially at stake and make them even more difficult to handle.

Finally, ad hoc scales, adapted to each local situation seems the most suitable. This is however not answering the question of defining the relevant scale for managing water issues across the whole territory of a great basin. Ad hoc scales are not allowing the definition of a unique association between any place and a unique territory of water management. This means that some places may belong to several such territories, inducing transaction costs between these various territories, balanced by a better adaptation to local contingencies which limit the appearance of untractable

conflicts. The dream of a perfect paving of the great basin in suitable territories should thus be left away.

Benefits of complexity

All case studies are raising issues of territory future plans. These future plans are good strivers for inducing dialogue in common frame between actors but is leading to the management of complex systems. This provides opportunity for opening the debate through the necessary introduction of the various stakes in relation with the future plan. In a situation of leaving away the idea of any perfect paving, this dialogue for a territory future plan can be the support for managing the interactions between the various entities to which a place may belong.

This complexity has to be conscious and managed otherwise it might also lead to insincere behavioural patterns. If it is not handled the “multiple hats” of stakeholders are implicit and they can hold positions in discussions not coherent with their own practices in other arenas. In another basin in South of France, where this complexity is not yet that much handled, individual irrigations is managed apart from collective systems. They are thus accused of being responsible for the whole system failure, while a significant number of farmers have individual wells as well as connections to collective irrigation systems.

This complexity is thus reinforcing the necessity of a long term thinking posture for a constructive and adapted collective action on the systems and an appropriation of any territory future plan by stakeholders (Avenier, 1997). And territory, as a place constituted of active interactions (Steinberg and Clark, 1999) is the right place for such long term thinking.

New role for basin institution

With all these possible territories for water management, rather local and possibly disconnected to any sub-basin scale, what might be the remaining role for basin institutions?

With this new framework without any perfect paving, they can very helpfully provide support in:

- finding the ad hoc scales institutions,
- backing the emergence and the activities of associations of communes whatever their administrative status is,
- check the coherence between the different territories taking in charge issues of water management.

In order to satisfy the principle of contingency, the first point is rather an issue of crafting (Ostrom, 1992) or “bricolage” which allows better a self reframing institution (Innes and Booher, 1999) and an adaptation to local specificities. Inter-municipal settings is emerging as a good basis for defining territories in many cases. Therefore it is an important trend to support so that they might be an efficient mean to implement real concerted action for water management. Then the co-existence in the same place of various territories dealing with water issues implies the necessity of a co-ordination among these territories. Regarding inter-connection between the water issues, basin institution seems to be an interesting institution to make them coherent one another.

CONCLUSION

In all the thinking over enforcement of Water Framework Directive and definition of relevant scales for water management, the dream of a perfect paving of space has probably to be left away. Such a perfect paving of space is actually not consistent with a genuine bottom-up approach: definition of a paving necessitates a point of view on the whole system and definition of a general rule of partitioning space, adapted to the whole great basin, which has thus more to do with a top down approach.

This abandon of any general definition of spatial partition has however to be more explored through the tension between co-ordination costs induced by overlapping of territories dealing with water

management issues and benefits coming from contingency and adaptation of these territories to local specificities. This tension has to be analysed taking in account the possibility of a decentralised co-ordination, thanks to basin institutions for example, as SMVO, which might make co-ordination costs induced not too high.

ACKNOWLEDGEMENT

This study has been funded through the EC Firma project, "Freshwater Integrated Resource Management with Agents" - EVK1-1999-70.

We would like to thank all students of "UA Gestion de la Ressource en Eau", year 2001, from ENSAM (Engineering High School for Agronomy in Montpellier) who did most of the field work, and Pierre Martinand for useful support in the analysis.

REFERENCES

- Avenier, M.-J., 1997. Une conception de l'action stratégique en milieu complexe : la stratégie tâtonnante. In: Avenier, M.-J. (Ed.) *La stratégie "Chemin faisant"*. Economica, pp. 7-35.
- Axtell, R., 2000. Effects of interaction topology and activation regime in several Multi-Agent systems. In: Moss, S. (Ed.) *MABS'00*, Boston, 8-9 July.
- Babin, D., Bertrand, A., 1998. Managing pluralism: subsidiarity and patrimonial mediation. *Unasylva* 49, 19-25.
- Bouwer, H., 2000. Integrated water management: emerging issues and challenges. *Agricultural water management* 45, 217-228.
- Duda, A.M., Ashry, M.T.E., 2000. Addressing the global and water environment crises through integrated approaches to the management of land water and ecological resources. *Water International* 25 (1), 115-126.
- Innes, J.E., Booher, D.E., 1999. Consensus building as role playing and bricolage: toward a theory of collaborative planning. *Journal of the American Planning Association* 65 (1), 9-26.
- Lansing, J.S., 1999. Anti-chaos, common property and the emergence of cooperation. In: Kohler, T., Gummerman, G. (Eds.), *Dynamics in human and primate societies*. Oxford University Press, pp. 207-223.
- Lascoumes, P., Le Bourhis, J.-P., 1998. Le bien commun comme construit territorial : identités d'actions et procédures. *Politix* 42, 37-66.
- Maton, L., 2001. La dynamique du comportement des viticulteurs du bassin versant de l'Orb. Rep. No. 2001-10. Cemagref, Montpellier.
- Meadowcroft, J., 2002. Politics and scale: some implications for environmental governance. *Landscape and Urban Planning* 61 (2-4), 169-179.
- Mermet, L., Treyer, S., 2001. Quelle unité territoriale pour la gestion durable de la ressource en eau? *Annales des Mines* (avril), 67-79.
- Nagaraj, N., 1999. Institutional management regimes for pricing of irrigation water: the french model lessons for India. *Agricultural systems* 61, 191-205.
- Ostrom, E., 1992. *Crafting institutions for self governing irrigation systems*. ICS Press, San Francisco.
- Salles, D., Zelem, M.-C., 1998. Les modalités de la décision publique dans le cadre des politiques de gestion de l'eau. Le cas des contrats de rivière dans le bassin Adour Garonne. In: *Politique publique et développement local*, Clermont Ferrand. Cemagref édition, pp. 39-53.
- Steinberg, P.E., Clark, G.E., 1999. Troubled water? Acquiescence, conflict and the politics of place in watershed management. *Political Geography* 18, 477-508.